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EXAMINER
NGUYEN, STEVE N

ART UNIT	PAPER NUMBER
2133	

DATE MAILED: 06/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/955,566	SHAH ET AL.
	Examiner	Art Unit	
	Steve Nguyen	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 September 2001*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☒ Claim(s) *8, 34 and 39* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 September 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☐ All   b)☐ Some * c)☐ None of:

   1.☐ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. _____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date *8/16/04, 6/5/03*. 3/5/02
4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 1-39 have been examined.

Claim Objections

2.   Claims 8, 34, and 39 objected to because of the following informalities:

Claims 8 and 34 recite the limitation, "wherein N selection signals select data for

elements in each of said N rows in said matrix, thereby specifying for all M elements in

each row which of said R elements from a previous column to select <u>data</u>". The

underlined word "data" should be removed from the claims to make clear that it is the R

elements that are selected in each of N rows and avoid ambiguity as to whether R

elements are selected or whether data is selected.

Claim 39 depends from claim 12, but claim 12 is not a machine-readable medium

as recited in claim 39. Claim 39 is also a substantial duplicate of claim 13. Applicant

may have intended claim 39 to depend from claim 38. Appropriate correction is

required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly
claiming the subject matter which the applicant regards as his invention.

3.   Claims 1, 14, and 27 rejected under 35 U.S.C. 112, second paragraph, as being

incomplete for omitting essential elements, such omission amounting to a gap between

the elements. See MPEP § 2172.01. The omitted elements are: the definition of N, M,

and R. It is assumed that N, M, and R represent integers greater than 1.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4.   Claims 1-3, 5, 11, 14-16, 18, 20-21, 24, 27-29, 31, and 37, rejected under 35

U.S.C. 102(e) as being anticipated by Takamichi US Pat. 6,615,388).

As per claim 1:

Takamichi teaches an apparatus for decoding data (Fig. 2) comprising:

- an array of storage elements having N rows and M columns (col. 3, lines 54-56),

  wherein an input of each element in each column may receive data from R

  elements of a previous column and an output of each element in each column

  may be received by R elements in a next column (col. 3, lines 63-64), and

- wherein said inputs and outputs are logically interconnected according to an encoder polynomial for an error correction code (col. 3, lines 20-23; path memory 13 is interconnected according to a Viterbi code).

As per claims 2, 15, and 28:

Takamichi teaches the apparatus and machine-readable medium as in claims 1, 14, and 27 wherein said encoder polynomial is a Viterbi encoder polynomial (col. 3, lines 20-23; path memory 13 is interconnected according to a Viterbi code).

As per claims 3, 16, and 29:

Takamichi teaches apparatus and machine-readable medium as in claims 1, 14, and 27 wherein R=2 for an encoder polynomial rate of ½ (Fig. 2).

As per claims 5, 18, and 31:

Takamichi teaches the apparatus and machine-readable medium as in claims 2, 15, and 28 wherein M is equivalent to the depth of a Viterbi trellis (col. 3, lines 54-55; the number of columns corresponds to the number of stages of the Viterbi trellis).

As per claims 11, 24, and 37:

Takamichi teaches the apparatus and machine-readable medium as in claims 1, 14, and 27 further comprising minimization logic to identify a storage element in a final column of said matrix from which to select data (col. 4, lines 14-18).

As per claim 14:

Takamichi teaches a forward-tracing array for decoding data comprising:

- a matrix of storage elements having N rows and M columns (col. 3, lines 54-56);

- connection logic for interconnecting said storage elements across columns according to an encoder polynomial such that each element may receive data from R storage elements in a previous column (col. 3, lines 63-64); and

- selection logic for selecting storage elements from said R storage elements from which to read data based on a calculated path metric associated with each of said R storage elements (col. 4, lines 14-18).

As per claim 20:

Takamichi teaches the apparatus as in claim 14 wherein said selection logic further comprises: N selection signals to select data for M elements in each of said N rows in said matrix, thereby specifying for all M elements in each row which of said R elements from a previous column to select data, said selections causing data to propagate through said matrix according to said encoder polynomial (col. 3, lines 64-67 to col. 4, lines 1-14; col. 4, lines 19-24).

As per claim 21:

Takamichi teaches the apparatus as in claim 20 wherein storage elements in a first column of said matrix are loaded with constant values and said selection signals select data for M-1 elements in each of said N rows (col. 3, lines 64-67 to col. 4, lines 1-6).

As per claim 27:

Takamichi teaches a machine-readable medium having code stored thereon which defines an integrated circuit (IC), said IC comprising:

- an array of storage elements having N rows and M columns (col. 3, lines 54-56),

  wherein an input of each element in each column may receive data from R

  elements of a previous column and an output of each element in each column

  may be received by R elements in a next column (col. 3, lines 63-64), and

- wherein said inputs and outputs are logically interconnected according to an

  encoder polynomial for an error correction code (col. 3, lines 20-23; path memory

  13 is interconnected according to a Viterbi code).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

5.   Claims 4, 17, and 30 rejected under 35 U.S.C. 103(a) as being unpatentable over

Takamichi as applied above, and in further view of Wolf (US Pat. 5,233,630).

As per claims 4, 17, and 30:

Takamichi teaches the apparatus and machine-readable medium as in claims 1, 14, and 27 above. Not explicitly disclosed is wherein R=3 for an encoder polynomial rate of 1/3. However, Wolf teaches that the coding rate of ½ has become one of the most popular rates, but other rates are also generally used. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a coding rate of 1/3. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that other code rates besides ½ are used.

6.   Claims 6, 19, and 32 rejected under 35 U.S.C. 103(a) as being unpatentable over Takamichi.

As per claims 6, 19, and 32:

Takamichi teaches the apparatus and machine-readable medium as in claims 1, 14, and 27 above. Takamichi teaches a matrix of memory cells grouped into N stages (col. 3, lines 54-56). Although it is not specifically mentioned that N is 64, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include 64 stages. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that the N stages disclosed by Takamichi could be any number of stages that were applicable to a particular Viterbi polynomial.

7.   Claims 7-10, 12-13, 33-36, 38-39, 22-23, and 25-26 rejected under 35

U.S.C. 103(a) as being unpatentable over Takamichi as applied to claim 1 above, and

further in view of Park (US Pat. 5,446,746).

As per claims 7 and 33:

        Takamichi teaches the apparatus and machine-readable medium as in claims 1

and 27 further comprising: selection signals for selecting data for each element in each

column from said R elements of a previous column (col. 3, lines 45-47 and col. 4, lines

19-24).

        Not explicitly mentioned is said selection signals generated based on a minimum

path metric associated with each storage element. However, Park teaches producing

select signals for a storage element based on a minimum path metric to find the

maximum likelihood path (col. 4, lines 23-28). Therefore, it would have been obvious to

a person of ordinary skill in the art at the time the invention was made to generate

selection signals based on a minimum path metric. This modification would have been

obvious to one of ordinary skill in the art, at the time the invention was made, because

one of ordinary skill in the art would have motivated to do so in order to recover

erroneous data based on maximum likelihood as detailed by Takamichi in col. 4, lines

14-18.

As per claims 8 and 34:

        Takamichi further teaches the apparatus and machine-readable medium as in

claims 7 and 33 wherein N selection signals select data for elements in each of said N

rows in said matrix (col. 3, lines 57-60), thereby specifying for all M elements in each

row which of said R elements from a previous column to select data, said selections

causing data to propagate through said matrix according to said encoder polynomial

(col. 4, lines 7-14).

As per claims 9 and 35:

Takamichi further teaches the apparatus and machine-readable medium as in

claims 8, 21, and 34 wherein said selection signals are generated by add-compare-

select units (col. 3, lines 45-53) selecting the lowest of R potential path metrics (detailed

above).

As per claims 10, 23, and 36:

Takamichi further teaches the apparatus and machine-readable medium as in

claims 9, 22, and 35 wherein R=2 for a code rate of ½ (Fig. 2).

As per claims 12, 25, and 38:

Takamichi teaches the apparatus and machine-readable medium as in claims 11,

24, and 37 but does not explicitly disclose wherein said minimization logic identifies said

storage element based on said storage element having a minimum path metric

associated therewith (col. 4, lines 14-18).

However, Park teaches producing select signals for a storage element based on

a minimum path metric to find the maximum likelihood path (col. 4, lines 23-28).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time

the invention was made to identify a minimum path metric. This modification would

have been obvious to one of ordinary skill in the art, at the time the invention was made,

because one of ordinary skill in the art would have motivated to do so in order to

recover erroneous data based on maximum likelihood as detailed by Takamichi in col.
4, lines 14-18.

As per claims 13, 26, and 39:

Park further teaches the apparatus machine-readable medium as in claims 12,
26, and 38 wherein said minimum path metric is determined based on a minimum of N
accumulator values of add-compare-select units associated with each of said N rows
(col. 4, lines 34-41; the values must be stored in an accumulator or storage element).

As per claim 22

Takamichi teaches the apparatus as in claim 21 wherein said selection signals
are generated by add-compare-select units (col. 3, lines 45-53). Not explicitly disclosed
is selecting the lowest of R potential path metrics.

However, Park teaches producing select signals for a storage element based on
a minimum path metric to find the maximum likelihood path (col. 4, lines 23-28).
Therefore, it would have been obvious to a person of ordinary skill in the art at the time
the invention was made to generate selection signals based on a minimum path metric.
This modification would have been obvious to one of ordinary skill in the art, at the time
the invention was made, because one of ordinary skill in the art would have motivated to
do so in order to recover erroneous data based on maximum likelihood as detailed by
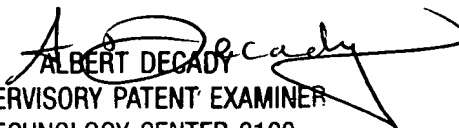Takamichi in col. 4, lines 14-18.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steve Nguyen whose telephone number is (571) 272-7214. The examiner can normally be reached on M-F, 9am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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